

marked, its scapular spots have large black terminal triangles and lack fine black transverse lines, its underparts have more distinct, finer barring, the upper surfaces of its outer primaries have much wider and more uniformly dark bands, but the undersides of the inner webs of the primaries have less prominent pale barring, and its tertials and upper tail surface are more prominently banded.

From *O. [m.] mendeni* (Peleng Island, off eastern Sulawesi, $n=3$ adults, entire world holdings), *collari* differs greatly in its much longer wing and tail. Additionally, its ear tufts are more heavily streaked and spotted, it has a paler bill, the darkest area of its face is between the bill and eyes, its upperparts have much broader streaks and larger pale spots, its overall plumage is much more uniformly brown, the streaking on its underparts is narrower, less blotchy, and lacks rufous areas around the black shaft streaks, its scapular spots have larger pale areas (rather than having black central cross-lines) and larger triangular black tips, its tertials are more prominently banded, and its tarsus is feathered much more distally.

Otus magicus

Compared to *O. magicus albiventris* and *O. m. tempestatis*, the small Lesser Sundas (Nusa Tenggara) subspecies of *Otus magicus*, *collari* differs in that the auriculars and area around the eye do not form a distinct dark patch, its white supercilium does not extend to the front of the face, its bill is browner, its upperparts are more twin-spotted, its lower underparts have smaller, less conspicuous white markings, its primaries have broader dark bands, its tertials are less prominently and less evenly banded, and its tail is much more broadly but less distinctly dark-banded. *Otus collari* also differs from *albiventris* in that its ear tufts are shorter, less pointed, more blotched, and have buffier bases, and its underparts are more finely vermiculated with fewer heavy black streaks. Additionally, *collari* differs from *tempestatis* in that its pale scapular spots have larger black triangular tips and lack narrow blackish cross marks. The five Moluccan forms of *Otus magicus* (Table 1) are all considerably larger than *collari*, and none closely resemble it in plumage.

Philippine taxa

To the north of Sangihe, the nearest related taxa are four disjunct Philippine races of Mantanani Scops Owl *O. mantananensis*: *O. m. cuyensis* (Cuyo I., west-central Philippines, $n=3$); *O. m. romblonis* (Romblon, Sibuyan, and nearby islets, $n=5$); *O. m. sibutuensis* [(including *steerei*, type examined), Sibutu and Tumindao, Sulu Archipelago, $n=15$]; and *O. m. mantananensis* (islets between Borneo and Palawan, $n=2$). Compared to all these taxa (combined), *collari* is smaller, especially its bill and feet, although its wings are longer and narrower (Table 1), the lower edge of its throat is less streaked, its facial disk is less distinct, and its tarsi are more extensively feathered. Additional differences exist between *collari* and each race of *mantananensis*.

Habitat, ecology, and conservation

The 1985 *Otus collari* specimen was collected "in cultivation of coconut, nutmeg and secondary growth, along stream, c. 50 m." at Manganitu (label data), and the species was also reported during the same time period from the upper slopes of Mt. Sahendaruman (F. G. Rozendaal, *in litt.* 1998). FRL's tape-recording and photographs were made of a bird calling 2–5 m above the ground in the understorey and lower parts of larger trees just before and after dusk on 30 July 1996 above Telawid Atas, at about 315 m altitude on the slopes of Mt. Awu, in a valley of remnant semi-natural habitat with tall durian and other trees, bamboo and scrub on the edge of a mixed plantation. *Otus collari* was also heard calling on 8 and 9 September at Telawid Atas (Riley 1997a), in November and December 1996 in forest on Mt. Sahengbalira and from agricultural areas around Telawid (Riley 1997b), and a captive obtained in Tahuna was said by locals to have come from nearby mixed plantations (Riley 1997b). Thus it appears to be widespread throughout Sangihe, from the coast to at least the lower parts of the hills. Given its apparent tolerance of mixed plantations, a habitat which has dominated the landscape of the island since the early part of the 20th Century (Heringa 1921, Whitten *et al.* 1987), *Otus collari* seems unlikely to be threatened.

Acknowledgements

For information, tapes, and other assistance we thank especially B. F. King, J. Riley, J. Wardill, F. G. Rozendaal, R. Ranft (National Sound Archives, London), and J. T. Marshall, Jr. Specimens were examined in or borrowed from the collections listed below, for which we thank the following: G. F. Barrowclough, J. Cracraft, M. LeCroy, P. Sweet and A. Andors, American Museum of Natural History (AMNH); L. Joseph, L. Bevier and D. Agro, Academy of Natural Sciences of Philadelphia; M. P. Walters and R. Prýs-Jones, The Natural History Museum, Tring, U.K.; A. Rahmani and S. Unnithan, Bombay Natural History Society; G. Hess, Delaware Museum of Natural History; D. Willard, Field Museum of Natural History; R. A. Paynter, Jr. and A. Pirie, Museum of Comparative Zoology, Harvard University; C. and J.-F. Voisin, Museum National d'Histoire Naturelle, Paris; S. Eck (MTD, Dresden); R. Dekker (NNM, Leiden); G. Boenigk (SNMB, Braunschweig); R. B. Payne and J. Hinshaw, University of Michigan Museum of Zoology; R. S. Symonds, University Museum of Zoology, Cambridge; S. L. Olson, J. P. Angle, B. M. McPhelim and J. Dean, National Museum of Natural History (USNM, Washington, D.C.); S. Frahnert and J. Fiebig, Museum für Naturkunde, Berlin; and K. Roselaar, Zoologisch Museum, University of Amsterdam. The manuscript was improved by N. J. Collar, R. C. Banks and G. R. Graves. J. Wardill provided photos, and J. C. Anderton painted the accompanying original watercolour plate.

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Misima's missing birds

by Mary LeCroy & William S. Peckover

Received 10 September 1997

We observed 37 species of birds on Misima Island, Louisiade Archipelago, Papua New Guinea during a visit from 1-12 October 1993. Comparison of our list with species collected on the same island by A. S. Meek in 1897 (Hartert 1898a,b, 1899) led to the discovery that

a number of species were "missing" from our list. Thinking that perhaps the missing species had been victims of the extensive habitat alterations that have taken place in the past century, we undertook a careful analysis of avian records from Misima. This paper presents our results and shows that the uncritical use of the published records might have led to false conclusions, but that careful analysis of archival and specimen records may provide unexpected discoveries and useful insights.

The Louisiade Archipelago has long been known to Europeans. Captain Luis Baez de Torres discovered it in 1606 and named it Tierra de San Buenaventura (Hilder 1980: 24 and fig. 6), but he sailed south of the bordering reefs and islands without making a landfall on or naming any of the islands individually. Perhaps unaware of the earlier Spanish name, Captain Louis-Antoine de Bougainville in 1768 called the group the Louisiade Archipelago to honour King Louis XV of France. On 14 June 1793, Captain A. J. R. Bruni D'Entrecasteaux sighted the island now known by its local name of Misima and named it St. Aignan for Frenay de Saint-Aignan, Lieutenant on the *Recherche*, a frigate under D'Entrecasteaux's command (Wichmann 1909: 267) (Fig. 1).

Existing collections and records

Between 1879 and 1930 two large and several small collections of birds were made on Misima. The largest was made by A. S. Meek who, with his brother W. G. Meek, one of the Eichhorn brothers never mentioned by name, and local assistants, visited in 1897, collecting for Lord Walter Rothschild. The part of this collection reported on by Hartert (1898a,b, 1899) is now in the American Museum of Natural History (AMNH) in New York. Hartert gives no clear idea of the number of specimens or dates of collection but lists 65 species and dates between late July and December. Meek (1913: 89) says that he spent three months on Misima. We were able to trace 273 former Rothschild Collection specimens at AMNH, including all species listed by Hartert except *Ducula zoeae*, and three species not listed by him, *Pluvialis squatarola*, *Sterna sumatrana*, and *Lorius hypoinochrous*. The nests and eggs collected remain in the Natural History Museum, Tring, U.K. formerly the British Museum (Natural History) (BMNH); most dates given for these by Hartert (1899) are in November and December.

The second largest collection was made by Hannibal Hamlin (MS), when leader of the AMNH Whitney South Sea Expedition, and two assistants. They spent 21–30 July 1930 at Bwagabwaga Bay on the south side of Misima, and 95 specimens of 23 species were catalogued, of which we traced 93. Weights and conditions of gonads are noted on the labels, as are some soft parts colours. This collection has not been reported as a whole, although specimens from it have been incorporated in various papers resulting from the Whitney Expedition and in Mayr (1941).

Hamlin (MS) was also in the Bonvouloir Islands in 1928: on Hastings Island on 8 October, collecting 27 specimens of seven species and seeing an additional one; on East Island on 10–11 October,

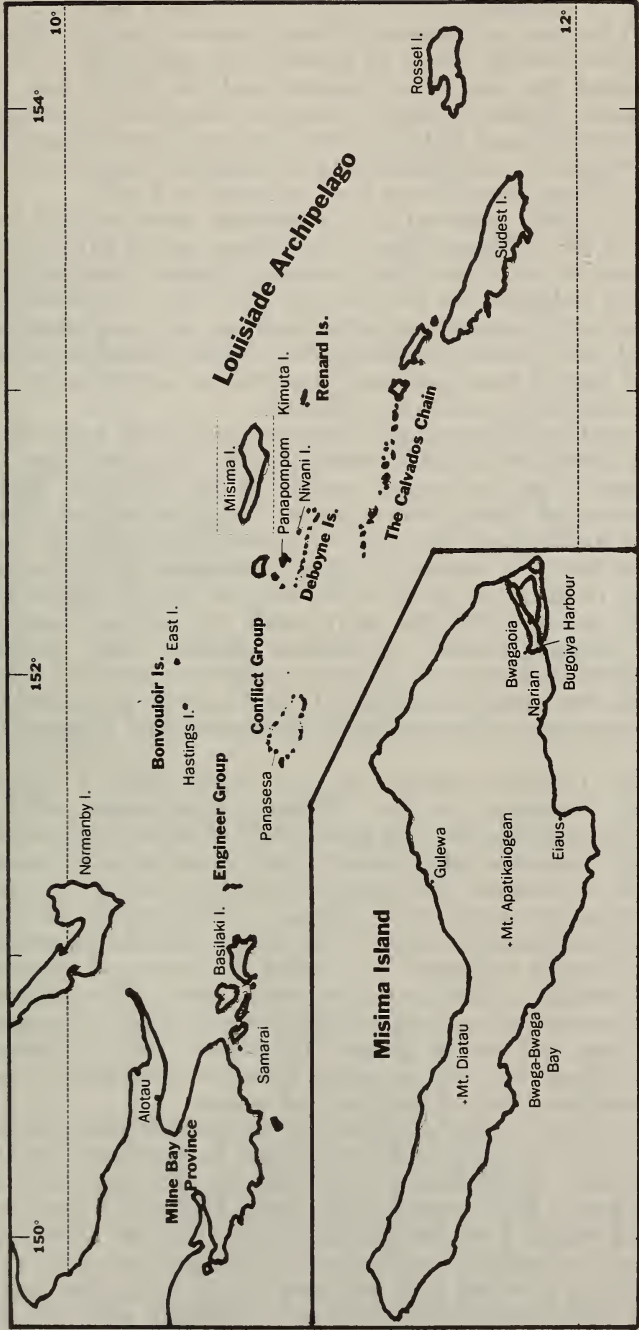


Figure 1. Southeastern tip of Papua New Guinea and the Louisiade Archipelago, inset enlarged to show Misima Island.

collecting 58 specimens of 11 species. On 28–29 April 1929 and 18 July 1930 he was on Panasesa [“Pana” means “island” (Brass 1959: 33)], Conflict Group, where he collected 29 specimens of six species and observed five additional species; and on 30–31 July 1930 on Panapompom, Deboyne Islands, where he collected 15 specimens of six species. On 19–20 and 30 July 1930 he was on Nivani Island, Deboyne Islands, where he recorded seeing nine species, apparently without collecting. These records have been included in Table 1.

Tristram (1882) reported on a collection made in 1879 by G. E. Richards, R.N., at Blanche Bay, New Britain, and on Misima. Richards was captain of the Royal Navy warship *Renard*, involved in survey work in the Solomon Sea (Wichmann, 1910: 269, 1912: 828–829). He sent a total of 62 species from both localities, but a complete list is not given and only *Lorius hypoinochrous*, *Esacus magnirostris*, *Pluvialis fulva*, and *Ducula pinon salvadorii* (*Carpodacus salvadorii*, described as new) were definitely ascribed to Misima.

Other small collections made about the same time were reported on by DeVis (1890, 1892) and Tristram (1889b). The specimens listed by DeVis were from collections made for Sir William MacGregor, Administrator of British New Guinea, during his official visits to the Louisiade Archipelago: the first, 11 species from Misima, was made during his first ten months in office (September 1888 through June 1889), but no dates are given by DeVis; the second, during June and July 1891, when collections were made on Misima (four species), nearby “Renard Island” (=Kimuta Island, nine species) and Panapompom (one species). We have considered only the species that were listed with specific localities (Table 1). Some specimens from the latter of these two collections are in the Queensland Museum (QM) in Brisbane.

Tristram (1889b) reported on the birds collected by Basil H. Thomson, Secretary to Sir William MacGregor, while on a government exploring trip. He spent 20–23 October 1888 on the island, anchoring “on the lee side at a spot which would be quite unsafe in the north-west monsoon”. His group, including geologists, apparently walked across the centre of the island. “We found that the limestone hills which compose the centre of the island were honey-combed with caves and densely timbered. We crossed the range and descended to a most romantic spot called by the natives Kaiaba . . . The eastern part of the island consists of very rugged hills, through which the streams have cut very deep and narrow gorges” (Thomson, 1889). Tristram listed five species from Misima, including *Cinnyris christianae* (= *Nectarinia aspasia christianae*) which he described as new.

Maitland (1893), who was unable to pinpoint Kaiaba, explored the headwaters of Gulewa Creek and thought perhaps this was the same area described by Thomson, implying that Thomson crossed from south to north. More recently, the Fifth Archbold Expedition spent 14 July–14 August 1957 on Misima. Brass (1959: 34) notes that a visit was made to “a big cave a mile or more up a creek from Ehaus [=Eiaus] village, about 4 miles west of camp. Caves on three levels were reported. Only the middle-level cave, seemingly called Kuiaba, was

TABLE 1
List of species known from Misima Island and small islands in the vicinity. See text for explanation. x = specimens, * = sight records

Species	Misima						Location					
	31 July			5-11 Sept			Kimuta					
	Meek	Hamlin	ML & WSP	Others	Sept		Meek	Devis	Panasasa	Pana- pom-pom	Nivani	East Hastings
<i>Fregata ariel</i>			*									
<i>Egretta intermedia</i>			*									
<i>Egretta s. sacra</i>			*				x					
<i>Dupetor flavicollis gouldi</i>			*				x					
<i>Haliastur indus</i>		x	*	x							*	
<i>Haliaeetus leucogaster</i>			*									
<i>Accipiter novaehollandiae misulae</i>	x		*									x
<i>Accipiter poliiocephalus</i>	x		*									
<i>Pandion haliaeetus</i>			*						*			
<i>Falco peregrinus</i>			*									
<i>Anas superciliosa rogersi</i>					9							
<i>Megapodius freycineti macgillivrayi</i>	x		*		11							x
<i>Amaurornis olivaceus</i>				*								
<i>Porphyrio porphyrio melanopterus</i>	x	x	*									
<i>Haematopus longirostris</i>							x					
<i>Himantopus himantopus</i>	x						x					
<i>Esacus magnirostris</i>				x			x					
<i>Glareola maldivarum</i>				*								
<i>Ploverialis fulva</i>				x	10		x	x			*	
<i>Ploverialis squatarola</i>							x					
<i>Numenius phaeopus variegatus</i>	x		*									
<i>Tringa brevipes</i>												
<i>Tringa hypoleucos</i>	x		*		11		x					
<i>Calidris acuminata</i>							x					
<i>Calidris ruficollis</i>							x					
<i>Calidris ferruginea</i>				*								

TABLE 1 (continued)

Species	Misima					Location				
	31 July	Meek	Hamlin	ML & WSP		Others	5-11 Sept		Kimuta	
<i>Sterna sumatrana</i>			*						x	*
<i>Sterna a. anaethetus</i>									x	
<i>Sterna bergii cristatus</i>									x	
<i>Anous</i> sp.			*							*
<i>Columba vitiensis halmahera</i>	x		x							
<i>Macropygia amboinensis cinctata</i>		x	x	*		x	9			
<i>Chalcophaps indica crysochlorata</i>				*			9			x
<i>Caloenas n. nicobarica</i>		x		*			6		x	
<i>Ptilinopus s. superbus</i>		x	x	*			6			
<i>Ptilinopus rivoili strophium</i>		x	x				11			x
<i>Ducula pistrinaria postrema</i>	x		x							
<i>Ducula pinon salvadorii</i>				*		x				
<i>Ducula bicolor spilorrhoa</i>		x				x	11			
<i>Trichoglossus haematodus micropteryx</i>							8		x	*
<i>Lorius h. hypoinochrous</i>				*		x				
<i>Cacatua galerita triton</i>		x	x	*						*
<i>Micropsitta pusio stresemanni</i>		x	x	*		x	10			
<i>Geoffroyus geoffroyi sudestensis</i>		x		*			11			
<i>Chrysococcyx lucidus plagosus</i>		x								
<i>Eudynamis taitensis</i>				*			10			
<i>Scythrops novaehollandiae</i>				*						
<i>Collocalia vanikorensis tagulae</i>		x		*		x			x	
<i>Collocalia esculenta misimae</i>		x		*					x	
<i>Halcyon macleayi incincta</i>		x								
<i>Halcyon chloris colona</i>				*			7		x	
<i>Halcyon s. sancta</i>		x	x			x				x

TABLE 1 (continued)

Species	Location									
	Misima					Kimuta				
	31 July	Meek	Hamlin	ML & WSP	Others	5-11 Sept	Meek	Devis	Panasesa	Pana- pom-pom
<i>Halcyon s. saurophaga</i>	x		x				x			
<i>Alcedo atthis hispidoides</i>	x		x							
<i>Merops ornatus</i>	x		x	*		10			*	
<i>Eurystomus orientalis waigouensis</i>	x		x		x					
<i>Coracina novaehollandiae melanops</i>	x		x							
<i>Coracina tenuirostris tagulana</i>	x		x	*	x					
<i>Lalage leucomela pallescens</i>	x		x			5				
<i>Gerygone magirostris olerosa</i>	x		x			10	x		x	x
<i>Rhipidura rufifrons louisadensis</i>			x	*	x	5				
<i>Rhipidura rufiventris nigromentalis</i>			x			9	x	x		x
<i>Monarcha cinerascens rossellianus</i>			x			5				
<i>Monarcha guttula</i>	x		x			11	x			x
<i>Monarcha trivirgatus melanopterus</i>	x		x	*			x		x	
<i>Myiagra rubecula sciutorum</i>	x		x	*			x			
<i>Myiagra cyanoleuca</i>	x		x	*			x			
<i>Myiagra alecto lucida</i>	x		x	*	x					
<i>Pachycephala pectoralis collaris</i>	x		x	*		10	x	x	x	x
<i>Dicaeum pectorale nitidum</i>				*						
<i>Nectarinia aspasia christinae</i>			x	*	x	10			*	*
<i>Zosterops g. griseotinctus</i>	x		x			5	x	x	x	x
<i>Myzomela albigula pallidior</i>	x						x		x	x
<i>Myzomela nigrita louisadensis</i>			x	*	x	8				
<i>Aplonis cantoroides</i>			x	*	x	11				
<i>Aplonis m. metallica</i>			x	*	x		x	x	x	
<i>Coreus o. orru</i>			x	*						

entered, in company with villagers from Ehaus." We feel that Thomson and his group probably anchored on the north coast, certainly "unsafe in the north-west monsoon", and perhaps not far from our locality of Gulewa where a track across the island, now a road, has its northern terminus. If they then walked across on this track they would come out on the south coast not far from Eiaus and Kuiaba cave. Additional circumstantial evidence that Thomson landed on the north coast is the establishment in 1889 of government headquarters for the Louisiades at Siagara on the north coast, where it remained only briefly before being moved to the protected site of Bwagaioia (Brass 1959: 19). It may be that Thomson's 1888 visit affected the choice of the first government station. If we are correct in our interpretation of Thomson's route, the "densely timbered" hills that he reported are largely denuded of forest today.

Brian Finch (1985) added two species to the Misima list from observations at the Misima airstrip at Bwagaioia in February 1985: *Glareola maldivarum* and *Calidris ferruginea*. More recently, Len Tolhurst (1996: 34–35) has reported two records for Misima: a breeding *Amaurornis olivaceus* and *Merops ornatus*. However, *Merops ornatus* was collected earlier by Meek (Hartert 1899: 212) and also by Hamlin (unpublished). No collections or observations have been made on Mt. Diatau (1,038 m) and Mt. Apatikaiogean (703 m), the two highest points on the island. Meek (1913: 86) mentions that his collectors obtained butterflies at higher altitudes, even though his base camp was at Bugoiya Harbour, and it is possible that some of his birds came from these areas as well.

Misima in 1993

Most of our stay on Misima was spent at and near the village of Gulewa, in a mixed forest-garden area ca. 200 m above sea level, 2 km south of the village. We spent 1–3 and 12 October at Misima Mines Pty. Ltd. headquarters and some observations were made there, and between there and Bwagaioia. All of these records are listed in Table 1.

At the time of our visit, Misima had had no rain in five months. The hillsides were very dry and local people were cutting and burning large tracts of the remaining forest for gardens. Many of the slopes that were being denuded of forest were very steep (up to 60°) and will be prone to erosion. Large trees were felled and burned on the site. Smaller timber was utilized to help prevent erosion, to build pig-proof fences around the gardens, or to build houses. Light showers early in our stay became more numerous and heavier, until by the time we left Gulewa the fires were all out and the air clear. Gardens already extended to the tops of some of the hills, although higher hills were still topped by forest. True gullies were not cultivated and some of these had sago trees and tree ferns growing in them. We did not see tree ferns or palm trees in the forest, but there were a few low palmetto-like plants on the forest floor.

Misima Mines Pty. Ltd. has provided numerous amenities to the local people, including a good road around the eastern half of the island and piped water into most villages. Most small streams near the coast

were dry, but water was still available at the village faucets. Larger rivers were still running and people used them for bathing and for washing clothes and dishes.

The country between the mine and Bwagaoia was mostly coconut plantations, with cocoa planted beneath the coconut trees. Both were old, unkempt, and dying; there were very few new plantings. There were some banana plantations in lower, presumably wetter, locations. Much of the northeastern end of the island is high, with cliffs, often deeply undercut by waves on the windward side. On the north coast, just outside Bwagaoia, there is an area of dry eucalypt forest. The beaches around Gulewa are coralline rock, sharp and pitted, with few areas of sand.

The forest remaining near the coast was very disturbed and largely dry, but there was some lush sago forest, even though the ground in it was dry at this season. Trails into the gardens from Gulewa were everywhere steep, and the soil in the gardens was very dry and rocky. Several residents were pasturing cattle in scrubby land.

We spent 4 days at a garden house about 200 m above Gulewa. The walk to this place began in a dry area of planted sago, coconut, breadfruit, cocoa, and betel nut. A few big forest trees had also been left in place, including "chestnut", *Terminalia* sp. As we started to climb, we went through established garden patches and then into newly cut forest, some still smouldering. This part was very steep and rocky.

Forest, apparently original, covered a small area adjacent to the garden house and topping the hill. Here there were tall buttressed trees, 25–30 m high, and the ground under them was relatively free of undergrowth. The interior of this forest was quite damp and everything green. Most mornings there was a heavy dew; this probably also gave the gardens some moisture, even though the soil was dry and powdery.

Human population growth in Misima is very rapid and this is undoubtedly a factor in the wholesale forest destruction. Catapults are much in evidence, including very large ones, 2–2.5 m long with a "Y" at the top about 30 cm deep. The basal end of the stock is pointed and is stuck in the ground and slanted to aim the catapult. Flying foxes and probably large birds are shot in this way.

Misima conforms to the pattern of bird distribution on other oceanic islands, with relatively few species of birds, but most of these common, and few understorey birds.

Re-analysis of Meek's collection

When we compared our sight records with the species known from Misima, it became apparent that Meek was the only collector to have obtained some species. Further analysis indicated that these were either very widespread species, migrants or species that are small island specialists, and we began to suspect that not all of his specimens came from Misima, even though they were labelled "St. Aignan" and Hartert had apparently accepted this locality. Our analysis also showed that he had collected bird specimens from 31 July–11 September and

26 November–28 December. Most of the anomalous species were taken in late November and December, although a few were taken on 31 July and 5–11 September. Fortunately, we were able to refer to Meek's letters to Rothschild, Hartert or Jordan at Tring, which are now in the Library of BMNH. One of us (WSP) has indexed these letters and they are now on microfilm. Microfilm letter nos 55–64 are the ones applicable to his Misima trip.

Letter no. 55, 9 July 1897, Samarai, Meek to Hartert: "... I shall draw £50 against them [his last collection] for current expenses until I can get a large consignment from St. Aignans, where I hope to be going in about a week from date. The best way I think will be for you to let Gerrard see what you select and for him to value them. I send them to you as I wish (after seeing your letter of 20th April) you to understand that I wish to be as fair as lay [*sic.*] in my power to be ..."

Letter no. 56, 24 July 1897, Cutter *Calliope* [Meek's boat], Samarai, Meek to Hartert: "... Am expecting to get away tomorrow or day after for St. Aignans ... I shall send a consignment from St. Aignans as soon as I can conscientiously do so, for as you've no doubt guessed by now, I'm rather short of money ... Most probably there will be two collections from St. Aignans ..."

Letter no. 57, 19 August 1897, St. Aignans I., British New Guinea, Meek to Rothschild: "It [the Misima birdwing butterfly] is very striking after being accustomed to the green insect; which I have now taken or seen, from Cape Vogel on mainland to the Engineer Group (the nearest group of islands west of St. Aignan's excepting the Conflicts). At the Engineer Group, the females run nearly black, nearly all having black forewings. I captured eight there on my way here."

Another page in the same letter, dated 29 August, "... at present I have something over two hundred bird skins ..."

Letter no. 58, 3 September, St. Aignan's I., Meek to Jordan: "... We have skinned about 230 birds ... so far I have only forty six species of bird, that I can recollect without referring to my books ..."

Letter no. 59, 10 October 1897, St. Aignan I., Meek to Hartert: "Having had scarcely anything but bad news to communicate up to the present time, you will be pleased to know that fortune has taken a favourable turn and am now happy in being able to say that I have now a very fair collection to [*sic.*] little over two months work ... This place is extremely poor as regards birds and mammals. I shall send collections by first opportunity ..."

Same letter, but dated 21 November: "... Shall be sending collections within a fortnight; seven cases in all ..."

Same letter, but dated 29 November, Samarai: "... Am sending six cases of Nat. History specimens and am drawing £200 against them. I think you will be pleased with them. Be on Rossell Island early in January. Written in haste."

Letter no. 60, 18 October 1897, St. Aignan's I., Meek to Rothschild: "... When these collections are dispatched, I intend to sail down to Rossell Island, leaving my collectors at a small island close here called Kimuta, where the Ornithoptera [bird-wing butterflies] are not quite as scarce ..."

Letters nos 61 and 62 have no year and are out of order. They are letters nos 45 and 46 in chronological order, having been written in 1896. They are not concerned with either Misima or Rossel.

Letter no. 63, 10 January 1897, Rossel I., Meek to Jordan: "... Arrived here two days ago from Misima (St. Aignans') bringing my men and five or six tons of yams. This last month I have been cruising around the islands, getting yams and boys. I left my boys on a small island off St. Aignan's named Kimuta. They got three more specimens of Ornithoptera identical with St. Aignan's and a good quantity of bird skins ..."

Letter no. 64, 11 January 1897, Rossel I., Meek to Rothschild: "... I left my men on a small island SE of St. Aignan's named Kimuta. They managed to get three more males of the blue Ornithoptera and some two hundred bird skins ..."

The 273 specimens from the Rothschild Collection, and one that came to AMNH from J. H. Fleming of Toronto and was never a part of the Rothschild Collection, did not seem to account for the number of birds that Meek referred to in the letters quoted above. When we listed AMNH specimens in field number order, we found that the lowest was 721, collected on 31 July, and the highest was 1233, collected on 28 December. This gives a total of 513, of which Rothschild selected only 273. We discovered this discrepancy to be explained by the fact that Rothschild frequently purchased only a portion of a collection, turning over the remainder to a dealer to sell for Meek. This is alluded to in the reference to Gerrard (E. Gerrard & Sons, a London dealer) in letter no. 55 above. Miriam Rothschild (1983: 158) states that Rothschild had an agreement with Meek to take "Six specimens of every species at 6/6 each, with a bonus of £4 for every new species". When one looks at the entire collection listed in field number order, it is apparent that Meek collected long series of common birds on certain days, interspersing that with the fortuitous collecting of rarer species when they could be obtained. Rothschild selected a series of six specimens of the common species and apparently took all specimens of species represented by fewer than six.

Fleming's collection is now in the Royal Ontario Museum (ROM) and includes 74 specimens from "St. Aignan", purchased by Fleming from Gerrard. These have not added any species to those reported by Hartert. Some of the Fleming specimens of *Pachycephala pectoralis* and *Zosterops griseotincta* are labelled "cotype" (=syntype in today's terminology). Their standing depends on whether or not Hartert wrote the 1899 paper before the collection was broken up. Most of the time he did not list the exact number of specimens, and internal evidence is rarely helpful. However, two bits of evidence indicate that he only considered the part of the collection that Rothschild bought, resulting in Fleming's specimens have no nomenclatural standing.

In his discussion of *Monarcha trivirgatus*, Hartert says: "Of this rare bird Meek sent four *males* and one *female* (italics his) from St. Aignan". The AMNH has three adult males, one adult female (identical in appearance to the males) and one female in immature plumage. The ROM has three adult males, two adult females and one immature

female; and the BMNH has three adult males and an adult female, none of which is mentioned by Hartert. Had he had all of these specimens, he would surely not have considered it rare.

Hartert gives measurements of two adult males of *Myiagra rubecula* saying, "the adult *males* (italics his) are giants . . ." AMNH has two adult males, one male in late immature plumage, two females, and one female?; the ROM has a further three adult males, one immature male, and two adult females; and the BMNH has an adult male and female. Had Hartert had them, he would surely have measured the additional "giant" males.

Replies to our enquiries disclosed an additional 48 Meek St. Aignan specimens at the BMNH, two at the National Museum of Natural History, Washington, DC (USNM), and one at the Liverpool Museum (LIVCM). None of these changed the species tally but did slightly alter dates, and they have been included in the preparation and discussion of Table 1. Also, the field numbers on non-AMNH specimens extended the collection numbers from 720 to 1234, giving a total of 515 birdskins originally collected, of which we traced 398.

One of the specimens at the BMNH came to them via the Hewitt Collection, the two at the USNM came from the Swales Collection, and the one at LIVCM was from the Barrow Collection. These specimens, once part of large private collections, lead us to believe that Meek specimens were acquired from Gerrard by many collectors and more may be extant but widely scattered. We would appreciate hearing of any additional Meek St. Aignan (Misima) specimens that are held in other museums.

Collecting localities and dates, a discussion of Table 1

We know that Meek was on Basilaki I. on 25 July (see account of *Ducula zoeae*, Meek no. 719, below) and on Misima by 2 August. No specimens were collected on 1 August. In letter no. 57, quoted above, Meek mentions that he collected the birdwing butterfly *Troides priamus* in the Engineer Group on his way to Misima, so we know that he made at least one stop on small islands between 25 July and 2 August; unfortunately the butterfly specimens have no exact date.

Six species of birds were collected on 31 July (ten specimens, beginning with Meek no. 720, one of which was not traced): *Columba vitiensis*, *Ptilinopus rivoli*, *Monarcha guttula*, *Pachycephala pectoralis*, *Zosterops griseotinctus*, and *Myzomela albigula*. The last three are well known as species occurring on small islands and have not been seen or collected by others on Misima, except for a specimen of "*Pachycephala melanura*" reported by DeVis (1892: 96) which cannot now be found in the Queensland Museum; until corroborated, it should be removed from the Misima list. *Columba vitiensis* is widespread but never common, and while frequently collected on small islands, this is not always the case. It was collected on Misima by Hamlin. *Ptilinopus rivoli* and *Monarcha guttula* are discussed below. In Table 1, 31 July birds are listed separately and are considered to be from one of the groups of small islands between Basilaki and Misima, probably the Engineer

Group; in any case, they do not change the species lists for Misima and Kimuta. During August, none of the small island species was collected.

From careful analysis of all the records, we think it likely that Meek moved some collectors from Misima to Kimuta early in September and had collectors in both localities, during at least part of the period between 5–11 September. Certainly, by 8 September he had some collectors on Kimuta. The only specimens in the collection with a locality other than “St. Aignan” are four specimens of *Aplonis cantoroides* collected on 8 September and marked “small island off St. Aignan” which, from letters nos 60 and 63 above, must refer to Kimuta.

The ten species collected on 1–4 September are included in the Misima list in Table 1 as they are widespread, have been reported by others on Misima, and all except *Collocalia vanikorensis* were also collected by Meek in August.

Specimens of the 27 species collected 5–11 September have been listed separately in Table 1. Only three of these were otherwise collected by Meek on both islands: *Tringa hypoleucos*, *Ptilinopus rivoli*, and *Monarcha trivirgatus*. Four species were collected only during those dates: *Anas superciliosa*, *Ducula pistrinaria*, *Ducula bicolor*, and *Eudynamis taitensis*. *Ducula bicolor* is reported by Tristram (1889b: 558) from Misima; the other three species are not otherwise reported but might be expected on either island. These three species are not counted for either island.

Eleven species were collected by Meek both during 5–11 September and on Misima in August: *Megapodius freycinet*, *Macropygia amboinensis*, *Ptilinopus superbus*, *Micropsitta pusio*, *Geoffroyus geoffroyi*, *Merops ornatus*, *Gerygone magnirostris*, *Rhipidura rufiventris*, *Monarcha guttula*, *Nectarinia aspasia*, and *Aplonis metallica*. Eight of these are known only from Misima; *Merops ornatus*, *Monarcha guttula* and *Nectarinia aspasia* have been reported from other small islands, but not from Kimuta (Table 1).

On the other hand, nine species were collected during 5–11 September and also on Kimuta in November and December: *Pluvialis fulva*, *Chalcophaps indica*, *Trichoglossus haematodus*, *Halcyon chloris*, *Rhipidura rufifrons*, *Monarcha cinerascens*, *Pachycephala pectoralis*, *Zosterops griseotincta*, and *Aplonis cantoroides*. Five of these have not been seen or collected on Misima. *Pluvialis fulva* has been collected by others, and we saw *Chalcophaps indica*, *Halcyon chloris* and *Aplonis cantoroides* (Table 1). Specimens collected on Kimuta on 5–11 September may have convinced Meek that it would be productive to leave collectors on Kimuta in late November.

Meek's activities between the last half of September and the end of November are not documented, but we are sure that he was not collecting birds because the highest specimen number from 11 September is 1030 and the lowest from 26 November is 1031. Apparently he was concentrating on collecting insects and other animals, as he was still writing from “St. Aignan” in October. Also, a cursory glance through articles on insects in *Novitates Zoologicae* in

1898 and 1899 (Rothschild & Jordan 1898, Warren 1899) disclosed a number of species obtained on "St. Aignan" in September, October and November.

Meek's note, added to letter no. 59 and dated 29 November, was written from Samarai, his home base and the port from which he would have shipped specimens. It seems logical to assume, then, that he had left his collectors on Kimuta a few days prior to this and returned home to ship the specimens and prepare for his month of cruising about, hiring helpers and buying food for his projected stay on Rossel I. (letters nos 60 and 63). Labels on specimens dated 26 November–28 December alone are not in Meek's hand, so we believe that all specimens from this period were taken by his collectors on Kimuta.

In Table 1, we have included in the Misima list species collected by Meek from 2 August–4 September; in the Kimuta list species collected 26 November–28 December. We have listed the specimens collected 31 July and 5–11 September separately. Analysed in this way, the number of species collected by Meek on Misima is 40; Hamlin added four, we added ten, Tristram added three, Finch added two, and Tolhurst added one, for a total of 60 species known from Misima. Meek collected 29 species on Kimuta, DeVis added two, for a total of 31 species known from Kimuta.

There were 14 species collected a century ago but not observed by us. Three, *Himantopus himantopus*, *Alcedo atthis*, and *Gerygone magnirostris*, are found near fresh water, of which we saw little. Three, *Micrositta pusio*, *Halcyon saurophaga*, and *Monarcha guttula*, are inconspicuous and/or local. Five, *Chrysococcyx lucidus*, *Halcyon macleayi*, *H. sancta*, *Merops ornatus*, and *Coracina novaehollandiae*, are southern migrants and our October visit was late for them.

Coracina tenuirostris tagulana is considered to be a resident race on Misima and Sudest. However, named populations of this species from New Guinea's satellite island should be reassessed, as Mees (1982) has synonymized the New Guinea race *muelleri* with the Australian race *tenuirostris* and considers most mainland New Guinea records, except those from the south of the island, to be migrants from Australia. He suggests that careful re-examination of specimens from the New Guinea islands may show them to be migrants also.

Meek collected one specimen of *Monarcha trivirgatus melanopterus* on 27 August on Misima and at least 13 on Kimuta, as well as the nest and egg Hartert (1899: 208) reported. This subspecies, type locality Round Island, a small island off Sudest, is probably also largely a small island specialist. Hamlin did not collect it on Misima but found it on East and Hastings.

Ptilinopus rivoli has perhaps actually become rarer due to hunting pressure. Meek collected at least six specimens; Hamlin collected one during a much shorter stay. Thus, with this possible exception and contrary to our first impressions, it is not apparent that any species have disappeared from Misima in the last hundred years despite massive habitat destruction. But a cautionary note should be sounded, for we have no reliable information on changes in abundance of any species; and forest species may already be at risk.

Taxonomic remarks

Seven subspecies' descriptions have been based on Meek's "St. Aignan" collection and have Misima as the type locality. These need to be re-examined in the light of the above re-analysis.

Accipiter novaehollandiae misulae. This subspecies was described by Mayr (1940: 11). Meek collected four females (including the holotype, AMNH no. 832853, Meek no. 858), two males in adult plumage and one immature male, during 18–29 August on Misima, which remains the type locality. No Meek specimens were found in other museums.

Collocalia esculenta misimae. Salomonsen (1983: 46) chose as his holotype AMNH no. 634526 (Meek no. 789), collected on 11 August. Three additional specimens were collected on 1 September, and Misima is the correct type locality. One specimen in the BMNH was collected on 4 December on Kimuta.

Alcedo atthis hispidoides. Stresemann (1913: 316) designated AMNH no. 636477 as holotype of a now-synonymized form, *Alcedo ispida pelagica*, a specimen collected on 3 September. This holotype is Meek no. 953; this number had been incorrectly overwritten as 963, but 953 is correct, judging by the collecting date. Five other specimens at AMNH and one at ROM were collected on Misima 2–30 August. None was collected elsewhere and Misima remains the type locality.

Gerygone magnirostris onerosa. Hartert (1899: 209) named *G. rosseliana onerosa* based on Meek's material. The holotype, AMNH no. 606581 (Meek no. 964), and another specimen were collected on 5 September; a third specimen was collected on 9 August. Hamlin collected the species on Misima, but it has not been reported from the smaller islands. We believe that the 5 September specimens came from Misima and do not recommend amending the type locality of this subspecies.

Pachycephala pectoralis collaris. Rothschild and Hartert (1918: 311) named *P. p. misimae*, now a synonym of *P. p. collaris*. Galbraith (1956: 203, 206–209) synonymized both *rosseliana* and *misimae* with *collaris* and considered Misima birds somewhat intermediate between the other populations. Differences are slight within the island populations, with Rossel birds more distinct, and Coates (1990: 211) has recognized *rosseliana*. *P. p. collaris* has been collected on Kimuta and in the Deboyne Group by others; according to Coates (1990: 211) it is confined to small islands in the Marshall Bennett, Bonvouloir, Conflict, Deboyne and Renard groups and Teste Island.

The holotype, AMNH no. 657996 (Meek no. 1044), was collected on 29 November on Kimuta and the type locality should be amended accordingly. Six additional AMNH specimens were collected on 31 July, 26 November, and 3, 4, 7 and 20 December. The ROM has 23 more Meek specimens from the following dates: 31 July (two), 10 September (three), November (two), and December (16). The BMNH has four more, collected 1, 17, and 28 December. These are from Kimuta and the small island where Meek collected on 31 July. The Fleming specimens in the ROM and AMNH are all marked "cotype" (=syntype), but Rothschild and Hartert designated a

holotype. The other specimens in AMNH from the Rothschild Collection would be paratypes, but the Fleming and BMNH specimens have no nomenclatural standing. The Kimuta specimens are, however, topotypes.

Zosterops griseotinctus griseotinctus. Hartert (1899: 210) named *Z. aignani* (= *Z. g. griseotinctus*). The lectotype (Hartert, 1920: 436), AMNH no. 700680 (Meek no. 1132), was collected by Meek on 7 December, and the type locality should be amended to Kimuta. Seven additional AMNH specimens (paralectotypes) were collected on 31 July, 5 September (four), 30 November and 17 December. Four ROM specimens and four BMNH specimens, all collected in December, were not seen by Hartert and have no nomenclatural standing. They are topotypes, as they are all from Kimuta. DeVis also reports this species from Kimuta and Hamlin from the Bonvouloir, Deboyne and Conflict groups. It has not been reported from Misima.

Mees (1961: 131–143) discusses the *Zosterops griseotinctus* group in some detail and synonymizes *Z. g. aignani* with *Z. g. griseotinctus*. He recognizes, as a poorly defined subspecies, *Z. g. longirostris*, including the specimens collected by Hamlin in the Bonvouloir Islands. Subspecies limits, and Mees' discussion (on p. 135) of the source of the similar but widespread small island populations that he includes in the species *Z. griseotinctus*, need to be reconsidered in the light of the discovery that the species does not occur on Misima itself. Perhaps they came, as Mayr (1944: 169, 1955: 44–45) has suggested, "ultimately from Torres Strait"; or even by westward expansion of some of the Solomons' species included by Mees in the *griseotinctus* group.

Myzomela albigula pallidior. *Myzomela pallidior* was named by Hartert (1989a: 21). In the original description, wing measurements of a male and a female are given. Hartert (1919: 174) designated the male as the lectotype, AMNH no. 692674 (Meek no. 725), collected on 31 July. According to our analysis, the type locality is not Misima, but it is uncertain which of the small islands between Basilaki and Misima it came from. We are not aware of any collections having been made in the Engineer Group, so do not know whether or not the species occurs there. There is only one female in AMNH, which becomes the paralectotype; it has Meek's no. 1178, and was collected 13 December on Kimuta. Four other males, all collected 4–17 December, are from Kimuta. The BMNH has two specimens collected 9 and 17 December. Hamlin collected it on small islands in the Bonvouloir Islands and in the Deboyne Group, and it has not been found on Misima.

Remarks on other species

In addition to those discussed below, we netted, photographed, and released the following species: *Accipiter novaehollandiae*, *Accipiter poliocephalus*, *Lorius hypoinochrous*, *Rhipidura rufiventris*, *Monarcha guttula*, *Myiagra alecto*, *Dicaeum pectorale*, *Nectarinia aspasia*, *Myzomela nigrita*, and *Aplonis metallica*.

Egretta intermedia. We saw a medium-sized egret with yellow bill and black legs and feet feeding in a marshy area near Bwagaoia. This is a first record for Misima.

Haliastur indus. Even though Richards collected a specimen, now in LIVCM, on 12 October 1879, it was not listed by Tristram (1882). Hamlin's specimen, collected on Misima on 23 July 1930, also remains unpublished. These two specimen records, along with our sight record, constitute the first published record of the species for Misima.

Haliaeetus leucogaster. We were first told of the occurrence of this species by A. Stevens and later saw it at several locations.

Falco peregrinus. Alan Stevens reported having seen a pair.

Megapodius freycinet. We were shown a mound, opened and emptied of eggs, in a recently cut forest area, with the debris still being burned.

Pluvialis squatarola. Meek collected three specimens of *Pluvialis fulva* on 10 September and 18 December, probably all on Kimuta. A fourth *Pluvialis*, collected by Meek on 20 December on Kimuta and published by Hartert as *P. fulva*, is actually a specimen of *P. squatarola*, showing the characteristic white rump and black axillaries of that species. That most of Meek's shorebird specimens were from Kimuta reflects both that Misima has few beaches and that the timing of his stay on Kimuta was better for northern migrants.

Sterna sumatrana. Meek collected a specimen on 23 December on Kimuta that was overlooked by Hartert. Hamlin reported "sumatras and noddies" common about Misima and in the Conflict and Deboyne groups.

Anous sp. As noted above, Hamlin reported noddies.

Chalcophaps indica. Hartert (1899: 214) declared this species to be very common. However, Meek's six specimens were collected on 9 September and in November and December, perhaps all on Kimuta. Hamlin did not collect it. We had one brief glance at an individual as it flew between patches of vegetation near Bwagaia. Its rarity in the areas we visited may be due to the high human population density, as this is a desirable food species.

Caloenas nicobarica nicobarica. Meek noted that the iris was yellowish-white in all three of his specimens. This differs from the grey iris usually noted for this species. Photographs of the species made on Tench Island by WSP show some individuals with a grey iris and some with a yellowish iris. In the AMNH, specimens having soft parts noted are about equally divided between a whitish-yellow and a grey or grey-brown iris, variable throughout the range and not related to sex of the bird. Young birds tend to have a brown iris. Other colours recorded were red or orange, umber, and two-tone with the outer ring grey and the inner tan (once).

Ducula pinon salvadorii. We saw this species and frequently heard its low-pitched calls. A young bird with feathers in sheath was brought in to us and photographed. Its plumage was identical to that of the adult; but the facial skin was bluish, unlike the red of adults.

Tristram (1882: 996) named this form *Carpophaga salvadorii* from specimens collected on Misima by G. E. Richards. One of these, a male, is now in LIVCM, no. T.10054, collected on 9 October 1879. Wagstaffe (1978: 8) noted that "Tristram, when describing this bird, had before him three specimens, one male and two females, but only the above specimen is listed in his catalogue and as a type. There are

two specimens in the British Museum, collected by Richards from the same locality and these are possibly the other syntypes." However, neither of the latter is listed by Warren (1966).

Robert Prŷs-Jones (*in litt.*) informs us that there are two specimens in BMNH that are most probably the ones referred to above. No. 1889.2.12.129 was "acquired via the Salvin/Godman collection. In addition to their label, it carries what I presume to be the original label (written on paper from 'The Australian!') stating: St. Aignan, Louisiade Archipelago, Capt. Richards R.N. No sex/age is given, but the register states ad." No. 188.11.14.20 "only carries a B.M. label which says merely Louisiade Archipelago, ex Tristram. No mention of a collector. However, the register shows it to be part of a batch purchased off Tristram and collected by 'Lieut. Richards'. Old string on the legs of the specimen suggests a label may have been lost." Listing of the male as the type by Tristram (1899c: 43) in his published catalogue serves to designate it as the lectotype and implies that the two BMNH specimens are paralectotypes [International Code of Zoological Nomenclature, Article 74(a)].

[*Ducula zoeae*. Hartert (1899: 213), without comment, lists this species as having been collected on Misima on 25 July. No specimen of the Zoe Imperial Pigeon from Misima or any other island in the Louisiade Archipelago is now in the AMNH, nor was one catalogued with the Rothschild Collection. Rothschild and Hartert (1901: 113) do not list a Misima specimen but do report a specimen (now in AMNH) collected by Meek on Basilaki Island on 25 July 1897. We believe that Hartert (1899) inadvertently included the Basilaki specimen and that this species should be removed from the Misima list.]

Trichoglossus haematodus micropteryx. Meek's specimens, now in AMNH, ROM and BMNH, were collected on 8 September (five), 29 November, 4 and 11 December, most likely all on Kimuta. Neither Hamlin nor we encountered it, and it is difficult to believe we could have missed this noisy species had it been present on Misima. We believe it is confined to small islands in this area. There is some evidence of small island populations differing subspecifically from adjacent mainland populations (Diamond & Lecroy 1979: 509) and exact information on collecting localities and weights might help clarify this distribution puzzle.

Lorius hypoinochrous hypoinochrous. This species does not appear in Hartert's (1899) annotated list of Meek's collection, and in fact he says "not sent by Meek" in his introductory remarks, but it does appear on his appended list of species known from Misima (1899: 216), based on Tristram (1882) and DeVis (1890). This surprised us very much, as it is perhaps the commonest species on the island. However, there are three males and three females in AMNH collected by Meek on Misima between 12 and 23 August, and Hartert (1898b: 530) discussed the Misima specimens in his paper on Meek's collection from Sudest Island.

Hamlin collected a male on 25 July; we heard and saw these birds in large numbers wherever we were on Misima. In the vicinity of Gulewa flowering coconut palms appeared to be a major food source for them,

and it is possible that they are now more common than previously due to the establishment and expansion of coconut plantations in the first half of the 20th century. We made tapes of their unusual cat-like calls.

Cacatua galerita triton. This very common species is a great agricultural pest, invading the gardens in large numbers. In one case, we counted a flock of 20 as they took off from a garden area. They dig up manioc tubers, and people are forced to cover young pineapples with plastic bags to try to deter this species. Other avian pests in the gardens were *Porphyrio porphyrio* and *Corvus orru*.

Scythrops novaehollandiae. We saw one individual flying over Gulewa on 5 October, presumably on its southward migration. This is a first record for Misima.

Myiagra alecto lucidus. We saw a female clinging to the trunk of a coconut tree, feeding.

Nectarinia aspasia christiana. Tristram (1889b) described this taxon (as *Cinnyris christiana*) based on two males collected by Thomson on Misima. One syntype, T.15504, collected on 20 October 1888, is now in LIVCM (Wagstaffe 1978: 22). The other syntype, formerly in the York Museum, is now in the BMNH, no. 1945.53.8, and was also collected on 20 October 1888 (Warren & Harrison 1971: 108). It is a very common species on Misima in all habitats; Meek also collected it on 10 September, and Hamlin reported seeing it in the Conflict and Deboyne groups. We saw one partial albino with scattered white feathers on the head and three all white tail feathers.

[*Myzomela rubro-cucullata*. This form was collected by G. E. Richards and described by Tristram (1889a: 228) as being from St. Aignan; the holotype is in LIVCM, no. T.10244. Salomonsen (in Paynter 1967: 360) believed that the locality was an error for Samoa Islands and equated it with *M. c. nigriventris*. Wagstaffe (1978: 22), however, says that the specimen "was examined by R. Sims at the British Museum in 1958 who confirmed its identity as *M. c. cardinalis*. No original field label is present but if Tristram were correct regarding the collector then it would have been collected in the Southern New Hebrides which Richards visited, not in Samoa." It was certainly not from Misima.]

Aplonis cantoroides. Meek collected one male and three females on 8 September on a "small island off St. Aignan", probably Kimuta. These are the only specimens in the entire collection that have a locality other than "St. Aignan" on the label. Meek did not obtain this species on Misima, but obtained an additional 11 specimens on Kimuta in November and December. We saw it near Bwagaioia, and six individuals stayed around some dead trees in the garden above Gulewa, calling and flying about as though preparing to nest.

The following two species were seen by us but not positively identified:

A rail-like bird ran zigzagging along the edge of a rotten fallen tree trunk in the forest. It seemed rather crouched, with its head stretched out horizontally. Only the reddish-brown head and blackish back were seen before it disappeared. Attempts to flush it again were unsuccessful.

The general size and description point to *Rallina tricolor*, but the species has never been collected in the Louisiades.

A medium-sized kingfisher was seen perched in bright sunlight on a low branch over the river. It was a solid, almost royal, blue with no indication of scaling on the head and the underparts were a rich rufous. When it flew, the only turquoise visible was in the rump. The bill was long, black and sturdy with a conspicuous red strip at the base of the lower mandible, and a white marking on the neck was very obvious. It resembled *Alcedo azurea*, which has not been reported from the Louisiades, except that *azurea* has no turquoise in the rump and neither the literature nor specimens indicate the presence of red at the base of the lower mandible.

Acknowledgements

We were able to visit Misima through the courtesy of the Misima Mines Pty. Ltd. and Placer Pacific Ltd., especially with the assistance of Ron Hiatt. The following mine personnel were extremely helpful to us while we were on Misima, allowing us to use mine facilities and personnel transport ("manhauls"): Poate Edoni, Ellis Illaia, Ian Lewis, Don Reid, Allan Storck, Alan Stevens, and Isreal Isreal, as was Len Selly of Poon Catering. We are especially grateful to Alan Stevens for his reports of a pair of Peregrine Falcons and a White-bellied Sea Eagle on the island, as well as other birds.

In Gulewa, Artu Sodias was very helpful in providing accommodation and assistance. Both he and Raynold Joshua helped us daily in the field and Darcy Siguia was of assistance in Gulewa.

Our thanks also to Beresford and Anne Love of Port Moresby for their ongoing help and friendship, and to Navu Kwapena of the Department of Conservation for his continued interest and help.

Michael Quinell, Anthropology Department, and Heather Janetski, Bird Department, Queensland Museum, tracked down relevant papers and specimens. Mark Peck and Brad Millen at the Royal Ontario Museum, Toronto, provided complete information on the Fleming Collection. At The Natural History Museum, London, J. C. Thackray, Archivist, and his assistants were very helpful during research on the Meek letters and Phil Ackery, Department of Entomology, replied to our queries concerning butterfly specimens; Robert Prÿs-Jones and Michael Walters at Tring searched out information on the Meek Misima specimens housed in The Natural History Museum, and answered our queries concerning the specimens collected by Richards and Thomson. In addition, Prÿs-Jones read drafts of this manuscript and made many very helpful suggestions, and Walters informed us of the published Tristram type list. Clemency Fisher and Anthony Parker, Liverpool Museum, kindly provided us with information on Meek, Richards, and Thomson specimens in their care; and Chris Milensky found Meek specimens in the National Museum of Natural History in Washington. David W. Snow and Chris Feare read the manuscript and suggested useful changes. To all of these we are most grateful.

The Library Staff at AMNH, Donald Clyde and Roscoe Thompson in particular, were always helpful, as were Diane Treon and Maria Rios, Ornithology Department, and Dan Rutter, Graphics, who prepared the maps. Thanks also to Lauren May and Ramsey Togo, whose computer expertise is most appreciated. Brian Coates' two fine volumes (1985, 1990) have greatly facilitated our research.

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